

REMARKS

Claims 1-10, 12-35, and 37-47 are pending. Applicants have amended claims 1, 12-14, 30, and 34 and canceled claims 11 and 36 without prejudice. Applicants have also added new claims 38-47. These amendments add no new matter. In particular, the concepts in claim 38 are supported in the specification, e.g., at page 5, lines 24-25 and in Fig. 2. The concepts in claims 39-47 are supported in the specification, e.g., at page 4, line 26, through page 5, line 25.

Election/Restrictions

The Examiner has alleged that method claims submitted in the previous amendment on March 6, 2006 are directed to an invention that is distinct from the invention that was originally presented and constructively elected. As a result, the Examiner has withdrawn claims 18-29 from consideration. Although applicants do not agree with the Examiner's reasons for withdrawing claims 18-29, applicants elect not to traverse the Restriction. Applicants further reserve the right to pursue the subject matter of the withdrawn claims in one or more divisional applications.

35 U.S.C. § 103

Claims 1-15 and 30-37 have been rejected as being allegedly unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Jurgensen, U.S. Patent No. 6,888,853 ("Jurgensen") and in view of Asano et al., U.S. Patent No. 4,817,413 ("Asano").

According to the Office Action (at pages 3-4), "AAPA describes (Specification, Background) well known laser processing including a CO₂ laser and including control and cutting of steel sheets." The Office admits that AAPA does not expressly disclose a means for decoupling diagnostic radiation, a measuring cell, or a sound detector, but alleges that Jurgensen and Asano provide the missing information.

The Office Action states (at pages 3-4):

Jurgensen describes (column 20, lines 60-65) the well known beam splitter and measuring cell and describes (column 34, lines 19-22) the use of splitter mirrors. Asano et al. describe (Abstract) old and well known sound monitoring.

The use of the sound monitor for monitoring the laser would have been obvious at the time applicant's invention was made to a person having ordinary skill in the art because it provides continuous monitoring capability for good apparatus control. The use of different species of splitting means and different pulse generating means would have been obvious as being a substitution of available known components. The instant claimed intended use of a control unit would have been obvious because the control units of the AAPA, Jurgensen, and Asano et al. can be configured for a wide variety of control. Asano et al. describe (column 3, lines 7-24) the use of a filter with the measuring cell.

Applicants respectfully disagree for the following reasons.

Applicants have amended claim 1 to recite a laser-processing machine "that produces laser radiation at a wavelength λ ... and that is operated with one or more laser-processing machine gases," where the laser-processing machine includes "a measuring cell into which a portion of the one or more laser-processing machine gases to be analyzed can flow," and "a sound detector for detecting a photo-acoustical effect due to absorption of the diagnostic radiation at the wavelength λ by the portion of the one or more laser-processing machine gases." None of the AAPA, Jurgensen, or Asano discloses such a laser-processing machine, and there is simply no suggestion in any of these references to combine them to provide a laser-processing machine with a photo-acoustic measurement cell configured to measure one or more laser-processing machine gases.

To combine Asano's photo-acoustic measurement methods with the AAPA via Jurgensen's radiation decoupling means, one of skill in the art would have had to have recognized the importance of monitoring gases in a laser-processing machine. In particular, one would have had to have recognized that some gases, e.g., SF₆ and/or C₂H₄, disturb the propagation of a CO₂ laser beam by causing effects such as beam widening, while other gases do not appreciably disturb the operation of a CO₂ laser. As a result, to assess the effects of laser-processing machine gases on the machine's operation, one needs to measure only gases that absorb radiation at the wavelength of the machine's laser. Therefore, by decoupling diagnostic radiation out of the machine's laser beam and using the decoupled radiation to measure gases, gases that absorb at the laser's wavelength are identified and measured, while other non-interfering gases are not measured. By measuring gases from the laser-processing machine –

e.g., working gases, cutting gases, welding gases, laser operating gases, and portions of the gas atmosphere in the laser beam path within the laser processing machine – the state of operation of the laser-processing machine can be monitored and adjusted.

However, none of the references cited by the Office disclose or suggest these aspects of the invention. In particular, none of the references disclose or suggest “detecting a photo-acoustical effect due to absorption of the diagnostic radiation at the wavelength λ ,” where the diagnostic radiation is provided by “a laser that produces radiation at a wavelength λ directed to a workpiece” as required by claim 1. In other words, the cited references fail to recognize that only gases that absorb at the wavelength of the laser in the laser-processing machine need to be measured.

Further, none of the references disclose or suggest “a measuring cell into which a portion of the one or more laser-processing machine gases to be analyzed can flow” as required by claim 1. In other words, none of the references recognize that the laser-processing machine can be monitored by measuring one or more gases sampled from the laser-processing machine.

Thus, there is simply no motivation to combine the AAPA with Jurgensen and Asano as the Office alleges. In particular, neither Jurgensen nor Asano provides any motivation to alter the systems of the AAPA. Therefore, the Office cannot properly combine these references because the office has failed to satisfy this prerequisite for combining references. *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984):

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under Section 103, the teachings of references can be combined only if there is some suggestion or incentive to do so (emphasis in original).

Absent such a suggestion to combine the cited references, a *prima facie* case of obviousness is not established for claim 1.

Claims 2-10 and 12-15 depend from claim 1, and are thus patentable for at least the same reasons. Thus, applicants respectfully request that the Office reconsider and withdraw the rejection of claims 1-10 and 12-15 over the AAPA in view of Jurgensen and Asano.

Next, the Office has rejected claims 30-37 as allegedly being unpatentable over AAPA in view of Jurgensen and Asano, for the same reasons set forth above in connection with claims 1-15. Applicants respectfully disagree.

Applicants have amended claim 30 to recite a diagnostic machine that includes “a radiation decoupler positioned downstream of a laser and in the path of laser radiation of wavelength λ that is directed to a workpiece such that at least a portion of the radiation is decoupled from the path of the laser radiation,” a measuring cell “into which gas to be analyzed flows from the laser,” and a sound detector “configured to detect a photo-acoustical effect due to absorption of the decoupled radiation at a wavelength λ by gas in the measuring cell.” None of the AAPA, Jurgensen, or Asano discloses such a diagnostic machine, and there is simply no suggestion in any of these references to combine the references to provide a diagnostic machine with a photo-acoustic measurement cell configured to measure one or more gases from a laser.

As discussed above in connection with claim 1, to combine Asano’s photo-acoustic measurement methods with the AAPA via Jurgensen’s radiation decoupler, one of skill in the art would have had to have recognized the importance of monitoring certain gases in a laser, and particularly gases that absorb at the wavelength of the laser. One of skill in the art would also have had to have recognized that this monitoring could be done using a portion of the laser’s output energy – in effect, using the laser to monitor itself. However, none of the references cited by the Office disclose or suggest these aspects of the invention.

Thus, there is simply no motivation to combine the AAPA with Jurgensen and Asano as the Office alleges. In particular, neither Jurgensen nor Asano provides any motivation to alter the systems of the AAPA. Absent such a suggestion to combine the cited references, a *prima facie* case of obviousness is not established for claim 30.

Claims 31-35 and 37 depend from claim 1, and are thus patentable for at least the same reasons. Thus, applicants respectfully request that the Office reconsider and withdraw the rejection of claims 30-35 and 37 over the AAPA in view of Jurgensen and Asano.

Applicant : Jürgen-Michael Weick et al.
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New Claims

New claims 38-47 have been added. Claims 38-42 depend from claim 1, and claims 43-47 depend from claim 30. Accordingly, claims 38-42 and 43-47 are patentable for at least the same reasons discussed in connection with claims 1 and 30, respectively. Thus, applicants respectfully request that claims 38-47 be allowed as well.

CONCLUSION

Applicants submit that all pending claims are now allowable and respectfully request a notice of allowance. Please apply any charges or credits to deposit account 06-1050, referencing Attorney Docket No. 15540-009001.

Respectfully submitted,

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J. Peter Fasse
Reg. No. 32,983

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906